

SUBSTITUTE SPECIFICATION - (Clean version)

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ICE CRUSHER**Field of the Invention**

10 The present invention relates to an ice crusher for chopping, crushing or breaking up ice and other frozen liquid foodstuffs.

Background of the Invention

15 Onion and vegetable choppers are known from EP-B-0'345'223 and WO01/58652 of the applicant. They comprise a housing able to be pushed over the product to be broken up and a knife which is guided in the housing and which may be displaced against the force of a spring by means of an actuating mechanism comprising a push button and a plunger. The knife comprises a cylindrical axle or rod on whose lower end a plate-like knife holder is seated. On the lower side of the knife holder there are fastened one or more downwardly projecting blades
20 which in a plan view are mostly wave-shaped or star-shaped. The knife may be displaced downwards against the force of the spring until the blade has completely penetrated the material to be chopped and abuts the base plate of the chopper. For the perfect functioning of all known choppers it is important that the lower cutters or cutting edges of the blades lie exactly in a horizontal plane.

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 Although such choppers are not designed for this, ice cubes are often cut up with known choppers in order to obtain finer pieces of ice for cocktails, drinks or for preparing foodstuffs. The chopping of ice may very easily blunt or bend the known blades. Bent blades jam very quickly with the scrapers, thereby significantly compromising the functioning ability of the
30 chopper.

 It is therefore the object of the invention to provide an apparatus which alleviates these disadvantages.

5 **Summary of the Invention**

 An ice crusher according to the present invention comprises a housing able to be pushed over the goods to be cut up and with an axle, or rod, which is guided in a housing upper part and which may be displaced downwards against the force of a spring by way of an actuating
10 mechanism with a push button, wherein the axle at its lower end carries a knife provided with a toothed cutter.

Brief Description of the Drawings

 Hereinafter, embodiments of the invention are described by way of the accompanying
15 drawings, in which:

- Fig. 1 is a partial longitudinal section through an ice crusher according to one embodiment of the invention;
- 20 Fig. 2a is a longitudinal section through a beaker according to a preferred embodiment form of the invention;
- Fig. 2b is a view from above into a beaker according to Figure 2a;
- 25 Fig. 3a is a longitudinal section through a shaker attachment with a lid;
- Fig. 3b is a view of the opened shaker attachment (without lid) according to Fig. 3a, from above;
- 30 Fig. 4a is a partial view of a knife according to a preferred embodiment of the invention;
- Fig. 4b is a partial view of a blade according to a further preferred embodiment of the invention;
- 35 Fig. 4c is a longitudinal section through a cutter of a knife according to Figure 4a; and
- Fig. 4d is a longitudinal section through the cutter according to Figure 4b.

5 Detailed Description

The ice chopper, or crusher, shown in Figure 1 comprises a housing 1 which consists of a multi-part upper part 2 and a preferably single-part lower part or beaker 3. The beaker 3 is connected to the upper part 2 by way of a bayonet closure 33 or similar device. Similar to the known onion and vegetable choppers, an actuation mechanism 4 is concentrically mounted and guided in the housing upper part 2. This mechanism comprises a push button 17 with a cap 18. In the housing upper part there is attached a knife 5 which may be displaced against the force of a spring by way of the actuation mechanism 4. The actuation mechanism 4 comprises a positive displacement mechanism which is known in the art and thus is not shown in detail in Figure 1. The positive displacement mechanism ensures that with each to and fro movement the knife 5 rotates about its longitudinal axis by a certain angle. This rotation movement ensures that the knife does not chop on the same spot. In contrast to known vegetable choppers, the present ice chopper does not require a scraper which may be pushed over the knife.

The knife 5 comprises a cylindrical vertical axle or rod 11 on whose lower end there is seated a horizontally arranged carrier plate 6. On the lower side of the carrier plate 6 there are fastened one or more downwardly projecting blades 51 which in a plan view are mostly wave-shaped or star-shaped. The present invention may employ any previously known blade shapes. For reasons of cost, the vertical rod 11 and the carrier plate 6 are preferably manufactured as one piece by way of injection moulding, wherein one injects around the blade 51 in an upper region, whereby the blade 51 becomes nondetachably fastened to the carrier plate. In order to withstand the loading during chopping, the knife 5 is preferably manufactured of sturdy blade sheet metal of 0.3 to 0.5, more preferably 0.4 mm thickness D.

In a preferred embodiment of the present invention, shown in Figure 1, the height H_K of the blade 51, the height of the beaker H_B and the maximal vertical path of the knife 5 limited by the actuation mechanism are selected and matched to one another such that the cutter 52 in its lowermost position does not come into contact with a beaker base 31. Thus in the lowermost knife position (in Figure 1 shown dashed) there remains an air gap H_S between the downwardly directed tips of teeth 53 of the cutter 52 and the base of the beaker 31.

As described below, the beaker fulfils a double function and is also used as a shaker lower part. In a preferred embodiment, it is therefore manufactured of stainless steel. The air gap H_S prevents a direct abutment of the cutter 52 with the stainless steel base and thus prevents

5 undesired blunting of the cutter and damage and scratching of the base 31. The height of the air gap H_S is preferably between 1 and 7 mm, more preferably between 3 and 5 mm.

In a further embodiment which is not shown, the above-described beaker may be replaced by a cylindrical housing part open to the bottom. The height of the housing is again
10 selected so that sensitive working surfaces are not contacted by the blades and will not be damaged on chopping.

With known choppers such an air gap is not desirable since it would lead to an unacceptable compromising of its functioning, however with the present ice chopper a complete
15 penetration of the ice cubes to be chopped is not necessary. The ice cubes are broken apart by the sturdy blade 51, and do not need to be completely severed.

The breaking-apart effect of the blade is further encouraged by preferred designs of the blade. With the blade shown in Figure 4a and 4c the teeth are ground on both sides, wherein the
20 cutting angle γ is preferably between 30 and 100°. With the blade shown in Figure 4b and 4d the teeth are ground on only one side and the cutting angle γ' is about 45°.

The toothing of the blade may be selected according to the blade material and the manufacturing costs. Two possible tooth shapes are shown in Figures 4a and 4b. On chopping
25 the hard and brittle ice cubes, the significant advantage of the toothed blades is that the teeth or the tips of the teeth simplify the penetration into the ice to be chopped.

In a further embodiment which is not shown, the teeth are bent alternately laterally out of the vertical plane of the blade and thereby reinforce the breaking-up effect of the ice chopper
30 blade. The teeth may also be bent out of the vertical plane of the blade sheet metal twisted about their vertical axis so that the tips of the teeth still essentially lie in one plane and may penetrate the ice with relatively little resistance, and the breaking-up effect is enormously increased on further penetration due to the torsion of the teeth.

35 Figure 2b shows an underlay 7 adapted to the beaker, preferably of a soft elastomer such as silicone. The underlay 7 may be permanently or detachably connected to the beaker base 31 and/or to a circumferential peripheral stand ring 32. On chopping, the underlay 7 prevents the working surface from being scratched, damps the knocks and prevents the chopper 1 from slipping on a working surface. When the ice has been reduced to the desired size, the beaker 3

5 may be removed from the upper part 2 by means of the bayonet closure 33 and may be removed from the underlay by lifting, and the upper part 2 with the blade may be placed on the free underlay 7. The depositing of the knife 5 on the underlay 7 simultaneously protects both the cutter 52 and the working surface from damage. The underlay 7 preferably has a peripherally thickened circumferential edge bead 71 which prevents melted water which runs down or drips
10 from the knife or other parts of the upper part 2, from running onto a working surface lying below this.

The sidewall 30 of the beaker 30 widens to the top at an angle α so that with the upper part 2 removed one may fasten a fitting shaker attachment, or top, 8 in a clamped manner. The
15 attachment, or top, 8, as shown in Figure 3 has a sidewall 81 which tapers downwards at an angle β and which towards the top merges into the neck 83 via a cone 82. A sieve plate 84 with pour-out openings 85 is attached in the neck 83, and a lid 9 may be placed on for closure. The angles α and β are between 1 and 15°, preferably 4°. Angles α and β and the diameters of the upper beaker region and the lower attachment wall are matched to one another such that the
20 attachment may be placed into the beaker approximately up to the transition of the wall 81 to the cone 82, thereby achieving an adequate sealing of the beaker to fluids.

The inner wall of the beaker is preferably provided with a grading in 10 decilitres and the shaker attachment lid 9 preferably has a volume capacity of 40 millilitres which is an
25 important measure to barkeepers.

In order to meet the standards of hygiene required for use in the kitchen and bar region, the chopper upper part, beaker, shaker attachment and lid are manufactured of stainless steel, plastic suitable for foodstuffs, or a combination thereof depending on design and the price class.

	1	ice chopper
	2	housing upper part
10	3	beaker
	4	actuating mechanism
	5	knife
	6	carrier plate
	7	underlay
15	8	attachment
	9	lid
	11	axle
	12	carrier plate
	17	push button
20	18	cap
	20	housing outer wall
	30	beaker wall
	31	beaker base
	32	stand surface
25	33	bayonet closure
	51	blade
	52	cutter, 52' cutter
	53	teeth, 53' teeth
	71	edge bead
30	81	attachment wall
	82	cone
	83	neck
	84	sieve plate
	85	pour-out openings